

## 5.2 Application of Similar Triangles

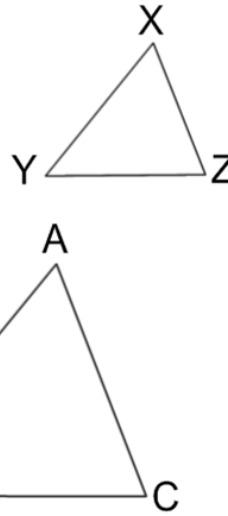
### Solving Similar Triangle Problems

The **scale factor** is the ratio of corresponding sides in similar triangles.

If  $\triangle XYZ \sim \triangle ABC$ ,  
and  $n$  is the scale factor, then

$$n = \frac{AB}{XY}$$

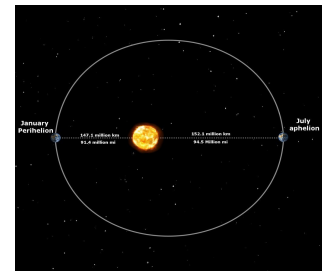
\* we often write the scale factor using the larger side over the smaller side



Similar Triangles and the scale factor can be used to determine distances that are difficult (or impossible) to measure directly.

For example.

- > distances across rivers and canyons
- > height of tall building or structures
- > distances in outer space



Steps:

1. Show triangles are similar using: SSS~, SAS~, or AA~
2. Use properties of similar triangles to determine unknown quantities:
  - ( ) corresponding angles are equal
  - ( ) corresponding sides are proportional

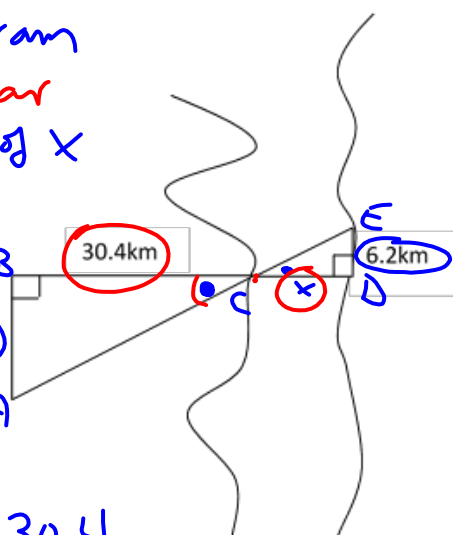
$$\text{If } \triangle ABC \sim \triangle XYZ, \quad \frac{AB}{XY} = \frac{BC}{YZ} = \frac{AC}{XZ} \quad \begin{array}{l} \angle A = \angle X \\ \angle B = \angle Y \\ \angle C = \angle Z \end{array}$$

Example 1: A surveyor would be able to take these measurements. Find the width of the river.

- ✓ Step 1: Label Diagram  
 ✓ Step 2: Prove Similar  
 Step 3: Calculation of X

Prove

$\angle ACB = \angle ECD$  (OAT) B  
 $\angle ABC = \angle EDC$  (given) 15.4km  
 $\therefore \Delta$ 's are similar by AA~



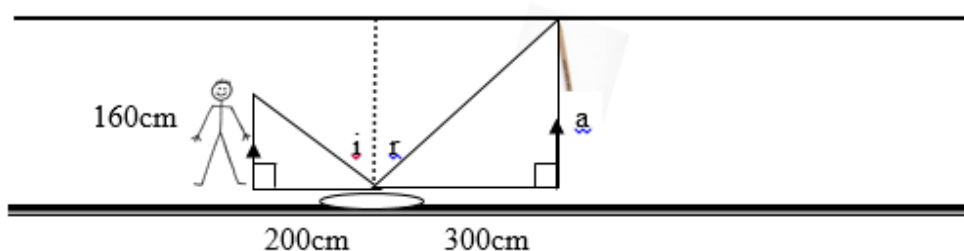
$$\cancel{30.4} \cdot \left( \frac{X}{\cancel{30.4}} \right) = \left( \frac{6.2}{15.4} \right) \cdot \frac{30.4}{1}$$

$$X = \frac{6.2 \times 30.4}{15.4}$$

$$X = 12.24$$

$\therefore$  the river is 12.24 km wide

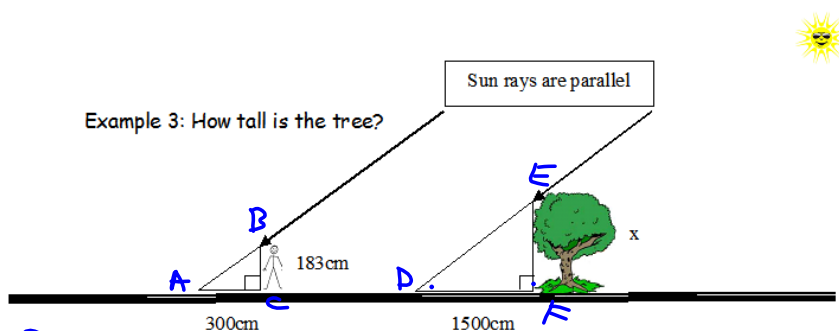
Example 2: What is the height of the classroom?



The two right triangles formed are similar. (why?)

1. Angle of incident and reflection are the same (law of reflection)  $i = r$
- 2.

Example 3: How tall is the tree?



Prove

$\angle A = \angle D$  (sun rays are parallel)

$\angle C = \angle F$  ( $90^\circ$ )

$\therefore \Delta$ 's are similar by AA

$\therefore$  the tree is 915cm tall.

$$\frac{x}{183} = \frac{1500}{300}$$

$$x = \frac{1500 \times 183}{300}$$

$$x = 915$$

Assigned Work: p.386 # 4, 6, 9, 12, 14\*